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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/058,541	01/28/2002	Reinhard Holste	2611 US	3724

7590

12/13/2004

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EXAMINER

LISH, PETER J

ART UNIT	PAPER NUMBER
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1754

DATE MAILED: 12/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/058,541

Applicant(s)

HOLSTE ET AL.

Examiner

Peter J Lish

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 14 and 15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14 is/are allowed.
- 6) ☒ Claim(s) 1-12 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/1/04 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watson et al. (US 3,653,833) taken with Miller et al. (US 4,044,098).

Watson teaches a method for the conversion of sulfur dioxide into a mixture of hydrogen sulfide and elemental sulfur. The process comprises heating the gas mixture of sulfur dioxide and a reducing gas to a reaction temperature of about 1,000 to 2,400 °F, reacting the heated mixture in the presence of a catalyst, and recovering heat from the product gas stream, thereby lowering the temperature of the stream to about 700 to 800 °F. The sulfur dioxide gas may be essentially pure or it may comprise only a small percent of a gas mixture, such as in an industrial

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waste gas. The reducing gas may contain at least one of carbon monoxide, hydrogen, or any gaseous hydrocarbons, such as methane, ethane, or natural gas. Watson does not teach possible uses for the product gas comprising hydrogen sulfide and elemental sulfur.

Miller et al. teach the removal of mercury from a natural gas stream by reacting the stream with an amount of hydrogen sulfide sufficient to cause the precipitation of mercury as mercury sulfides. The sulfides of mercury are then scrubbed from the natural gas stream and further removed by a filter.

It would have been obvious to one of ordinary skill at the time of invention to use the hydrogen sulfide containing gas of Watson et al. as the hydrogen sulfide source of Miller et al. because it is obvious to use the product of one process as a reactant in another process if they are similar materials and the "other process" requires the product of the first process, as held by *In re Kamlet*, 88 USPQ 106.

Regarding the reaction of the elemental sulfur with the mercury to form mercury sulfide, it is inherent that this reaction occurs, as is known in the art.

Regarding claim 8, Watson teaches the cooling of the hydrogen sulfide containing gas to a temperature of about 700-800 °F. It is expected that this temperature is suitable for the reaction with the mercury containing natural gas because it is a significantly high temperature to achieve gaseous reactions. Alternatively, it would have been obvious to one of ordinary skill at the time of invention to cool the hydrogen sulfide containing gas of Watson to a temperature that is suitable for its reaction with the mercury containing natural gas.

Regarding claims 9-10, Watson does not explicitly teach the use of gas/gas heat exchangers for the heating and cooling of the gas streams. It would have been obvious to one of

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ordinary skill at the time of invention to use a heat exchanger of this type, however, as they represent known methods of heating and cooling gaseous streams which are effective to achieve the temperatures desired by Watson et al.

Regarding claim 11, Miller et al. does not explicitly teach uses of the natural gas prior to the mercury removal. It would have been obvious to one of ordinary skill at the time of invention, however, to use any heat energy of the natural gas in an efficient manner, such as for the heating of another process stream, i.e. air.

Allowable Subject Matter

Claim 14 is allowed. The following is a statement of reasons for the indication of allowable subject matter: The prior art of reference neither teaches nor suggests the diversion of a partial stream of the flue gas to be converted to hydrogen sulfide and elemental sulfur, which is mixed with the flue gas upstream of the separator in order to react with the ionic and elemental mercury created during combustion.

Response to Arguments

Applicant's arguments, filed 8/19/04, with respect to the rejections of claims 1-12 and 15 have been fully considered but they are not persuasive. Applicant argues that the present invention teaches the removal of metallic mercury in addition to the removal of ionic mercury, whereas the prior art applied in the rejections of the previous office action does not teach the removal of metallic mercury. First it is noted the applicant's arguments rely upon the assumption that the hydrogen sulfide used in Miller et al. does not inherently remove any

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metallic mercury. No evidence is shown that hydrogen sulfide fails to remove any metallic mercury, while elemental sulfur (to which the hydrogen sulfide breaks down in the reaction) removes the metallic mercury. It is expected that the hydrogen sulfide of Miller et al. does at least partially remove the metallic mercury.

Second, the combination of Watson et al. with Miller et al. teaches the supply of a gas containing both hydrogen sulfide and elemental sulfur. As stated by the examiner in the rejection, the elemental sulfur inherently reacts with the mercury to form mercury sulfide, as is known in the art; See previously applied reference to Rosenthal et al., US 6,214,304. It therefore would have been obvious to use the hydrogen sulfide and elemental sulfur containing gas product of Watson et al. in the process of Miller et al. to remove mercury for the reasons stated in the previous office action. While Miller et al. may not contemplate the introduction of elemental sulfur, Miller et al. does not teach away from the use of a hydrogen sulfide gas that also contains elemental sulfur.

Applicant additionally argues that because Miller et al. does not note the removal of metallic mercury, there exists no motivation to modify the process to include additional steps to remove the metallic mercury. However, no additional steps are seen to be necessary, and no additional steps are claimed.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the

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applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Lish whose telephone number is 571-272-1354. The examiner can normally be reached on 9:00-6:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PL


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